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Applicant : Chinnugounder Senthilkumar et al. Art Unit : 2817
Serial No. : 10/695,263 Examiner : Michael B. Shingleton
Filed : October 27, 2003
Title : OSCILLATOR WITH TUNABLE CAPACITOR

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Please amend the claims as follows (this listing of claims replaces all prior listings):

19. (Currently amended) A method of generating a time signal comprising:
generating a system time signal using a real time clock circuit that has a tunable oscillator
for adjusting an operation frequency of the real time clock circuit, the tunable oscillator having a
set of MOSFET capacitors that can be independently selected;

receiving a reference time signal over a network;
adjusting a set of control signals to modify a selection of a subset of the MOSFET
capacitors in the tunable oscillator to increase or decrease the operating frequency of the real
time clock circuit in response to a difference between the system time signal and the reference
time signal.

20. (Cancelled) The method of claim 19 wherein adjusting the tunable oscillator
comprises adjusting a set of control signals to modify a selection of a set of capacitors within a
capacitor bank, the selection of the set of capacitors correlating to the operating frequency of the
real time clock circuit.

21. (New) The method of claim 19, further comprising biasing the MOSFET
capacitors so that the selected MOSFET capacitors each has a specified capacitance.

22. (New) The method of claim 21, further comprising generating the control signals
by using a logic circuit, and decoupling the capacitors from the logic circuit to prevent noise in
the logic circuit from affecting the capacitors.

23. (New) The method of claim 22, further comprising generating a filtered voltage
signal to power a buffer circuitry that decouples the capacitors from the logic circuit.

24. (New) The method of claim 23 in which biasing the MOSFET capacitors
comprises using the filtered voltage signal to bias the MOSFET capacitors.

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25. (New) The method of claim 19 in which the tunable oscillator comprises a resonator.

26. (New) The method of claim 25 in which modifying a selection of a subset of the MOSFET capacitors comprises using a subset of transmission gates to connect the selected MOSFET capacitors to the resonator.

27. (New) The method of claim 26, further comprising generating the control signals by using a logic circuit, and decoupling the transmission gates from the logic circuit to prevent noise in the logic circuit from affecting the selected capacitors through the transmission gates.

28. (New) An apparatus comprising:
MOSFET capacitors, each selectable through an independent control signal generated by a logic circuit, the selected capacitors to provide an amount of capacitance that is the sum of the individual capacitances of the selected capacitors;
a real time clock to generate an oscillating signal having a frequency dependent on the amount of capacitance provided by the selected MOSFET capacitors; and
a data processor to generate a system time signal based on the oscillating signal, to receive a reference time signal, and to control the logic circuit to select a different subset of the MOSFET capacitors to increase or decrease the frequency of the oscillating signal in response to a difference between the system time signal and the reference time signal.

29. (New) The apparatus of claim 28, further comprising a low pass filter connected to a voltage supply to provide a filtered voltage signal to bias the MOSFET capacitors.

30. (New) The apparatus of claim 29 in which the MOSFET capacitors comprise P-type enhancement mode MOSFETs.

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31. (New) The apparatus of claim 29, further comprising buffer devices to decouple the MOSFET capacitors from the logic circuit to prevent noise in the logic circuit from affecting the capacitors.

32. (New) The apparatus of claim 31 in which the filtered voltage signal is used to power the buffer devices.

33. (New) The apparatus of claim 28 in which the real time clock comprises a resonator coupled to the selected MOSFET capacitors.

34. (New) The apparatus of claim 33, further comprising transmission gates, each corresponding to one of the MOSFET capacitors, to couple the selected capacitors to the resonator.

35. (New) The apparatus of claim 34, further comprising buffer devices to decouple the transmission gates from the logic circuit to prevent noise in the logic circuit from affecting the selected capacitors through the transmission gates.

36. (New) The apparatus of claim 28 in which the MOSFET capacitors comprise drain-source connected MOSFET capacitors.

37. (New) The apparatus of claim 28 in which at least one of the MOSFET capacitors has a capacitance that is less than 1 pF.

38. (New) The apparatus of claim 28 in which each capacitor comprises an N-type depletion mode MOSFET.

39. (New) The apparatus of claim 38 in which the real time clock comprises a resonator coupled to the selected capacitors.

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